

We may test the scheme by seeking to apply it to one of the simplest but most definite instances of morphogenesis—namely, that of the mushroom, which we noticed on an earlier page : * A mushroom', writes Bertalanffy, * consists of a material growing irregularly at the circumference of the hat-like form, the felt-work of the fungal threads. Here we find no chemodifferentiation, no separation of organ-forming materials, no unequal distribution of determinative substances which must be the foundation of all development according to the chemical theory ; instead we find a *wholly homogeneous [chemically] material which nevertheless attains a definite form.* Moreover, there is at least the appearance that the same holds for all cases of organogeny. The endlessly complicated system of bones, the elaborately arranged muscles of the arm or leg, consist—so far as we know—of fairly uniform cells, not much different from the case of the mushroom. Chemically homogeneous material, muscle, bone-cells, reaches an organization endlessly complicated in form. Thus it seems that, in embryonal development, in addition to chemical differentiation, there is yet another factor, a particular formative factor.'

And if the suggested scheme seems to be of very doubtful adequacy, in face of the simplest possible problems of colour distribution and form determination, how much more inadequate in face of the problem of the genesis of a complex instinct such as that which impels a bird to build a nest after the precise pattern proper to the species, selecting for the purpose just the few kinds

of material
proper to its species !
This bold attempt by Goldstein has at
least the merit
of recognizing in a very broad way the
essence of the
problem of morphogenesis implied by the
theory of genes.